

NSLS-II Experimental Tools (NEXT)

February 2017 Project Activity

Report due date: March 20, 2017

SMI SAXS Chamber



Left: All modules installed except for the back end-cap module. Detector Z rail system in place and aligned. The flat bed of the XYZ "trolley" can be seen on the track, and has been tested for smooth motion along the entire 6.5m length. Next steps: receive, prepare, and load the cable track, followed by final assembly of the entire mechanism. Right: view from just upstream of the WAXS/sample chamber.



Left, center: In-vacuum brackets and stages that support the Pilatus 1M SAXS detector and provide XY motion. Limit switches are wired, and motors are being connectorized. Right: beam stop assembly, which will sit in front of the SAXS detector assembly, is wired and bench tested. The tungsten beam stops have been machined and are ready to install.



Left: Turbo pump and isolation valve installed beneath the SAXS chamber, awaiting connection of services. Center: large gate valve separating the SAXS vessel, which will be opened rarely for detector servicing, from the WAXS chamber, which users will access with samples. Right: 8 in-vacuum motor cable harnesses connectorized at one end, ready for installation in the cable track.

OVERALL ASSESSMENT

The SIX beamline took first light on February 21, propagating beam through the entire photon delivery to the sample position during the first 16 hours of commissioning. During the next commissioning period (February 25), SIX achieved its flux KPP at 75 mA ring current, measuring a flux value greater than the objective KPP value at that current.

At the end of February, all five NEXT beamlines had met their objective flux KPPs.

At SMI, the SAXS beam chamber installation made good progress this month (cover figure). Completion is expected by the end of March. Commissioning of the SMI photon delivery system continued in February, with beam propagated to the 12-ID-C hutch and the flux measured there achieving the Objective KPP value when scaled to 500 mA beam current.

Installation of the SIX endstation components, consisting of the sample chamber and the 15m-radius emission spectrometer, was substantially complete by the end of February. Installation of one remaining mirror, completion of cabling, and vacuum testing are expected by the end of March. A fixed-exit-port flange installed on the sample chamber will be used for spectrometer commissioning until the Triple Rotating Flange (TRF) is received; delivery of the TRF is expected in May.

Of the 63 major procurement contracts, 50 are closed, 8 others are complete for NEXT scope, and 5 have work remaining for NEXT: one, shared between ESM and SIX, awaits delivery and acceptance of the SIX M4 and ESM M4 mirrors; two, for ISR, await receipt and approval of commissioning reports (for the Dual Phase Plate Assembly and 6-circle Diffractometer); and two, for SIX (Sample Chamber and Emission Spectrometer), require completion of installation and receipt of the TRF.

As of February 28, 2017, the project is 99.3% complete on base scope performance earned to date. The cumulative EVMS schedule and cost indices remained at the same values as in January: SPI = 0.99 and CPI = 0.94. Post-February-deadline accruals are expected to bring the cumulative CPI back to 0.93.

One PCR was processed in February: PCR_17_122, "Extended Support for NEXT Project Closeout, Update of WBS Dictionary, and SIX Milestone Revision", increasing BAC to \$83.09M. Cost contingency is \$6.91M, compared to \$0.56M BAC work remaining.

The EAC, reported as the sum of actual cost to date (ACWP) plus the estimated cost to complete (ETC), is \$89.22M, essentially flat compared to the January value. As of the end of February, contingency on EAC is \$0.78M, which represents 53.0% of \$1.47M EAC work remaining, or 416.1% of \$0.19M unobligated work to go (\$1.28M of the remaining work is obligated to fixed-price equipment contracts).

COMMON SYSTEMS

All Common Systems work on ISS, ESM, SMI, and ISR has been completed.

Completion of the remaining SIX Mechanical and Electrical utilities installation work is in process in the SIX Satellite Building. Additional electrical power has been installed at the

end of the spectrometer arm for the detector. Installation of compressed air service to the spectrometer arm is in process and is expected to be finished before the end of March.

BEAMLINE CONTROLS

With the SIX beamline successfully taking first light in February, controls effort for this beamline is complete. All beamline controls activities in NEXT scope are now complete.

ESM – ELECTRON SPECTRO-MICROSCOPY

Receipt and acceptance of the M4 mirror are the only remaining ESM activities. This mirror, a focusing ellipsoid with challenging figure error specifications, will provide beam to the photoemission microscope in the XPEEM branch. BNL expects to take delivery of this mirror in March.

ISR – IN-SITU AND RESONANT HARD X-RAY

Installation of the cable guide system for the ISR Instrumented 6-Circle Diffractometer in Hutch C was completed by the ISR team on February 8 (see Figure 1). Commissioning of the diffractometer was also completed, and the only remaining milestone for this contract is receipt and approval of the commissioning report.

Effort in late February turned to preparation for ISR's first science commissioning using the *in-situ* endstation in Hutch D. User groups from Stony Brook University and the University of Vermont will arrive on March 1 in order to begin their studies of the effects of growth rate on ferroelectricity in sputtered oxide bilayers.



Figure 1. ISR: Installed cable guide system for the ISR Instrumented 6-Circle Diffractometer.

ISS – INNER SHELL SPECTROSCOPY

General user operations at ISS were approved on February 23.

SIX – SOFT INELASTIC X-RAY

The IRR of SIX was held on February 15 with no pre-start findings. Authorization to proceed was received from the NSLS-II Director on February 17, and first light was taken on February 21. In the first few hours of study, a low-current beam (2 mA) was propagated down to the diagnostic chamber located between the exit slit and the M4 chamber. The ring current was increased up to 100 mA during the following study time on February 24-25, and the monochromatic flux was measured to exceed the objective KPP value of 1.5×10^{11} photons/sec over a wide range of photon energies on February 25 (Figure 2).

Installation of the SIX sample chamber and emission spectrometer (Bestec) continued during February. The flatness of the 500-mm long flat mirror M7 mounted in its holder was measured, and found to be below 80 nrad for any contiguous 210-mm beam footprint over the entire surface (Figure 3), which is better than the specified value of 100 nrad. After completion of optical metrology mounted in their holders, the M6 (Figure 4) and M7 mirrors were installed and surveyed in location inside the spectrometer optics chamber. The detector chamber, the optics chamber, and the beam pipe connecting the two were put under vacuum and leak checked, in preparation for baking (Figure 5).

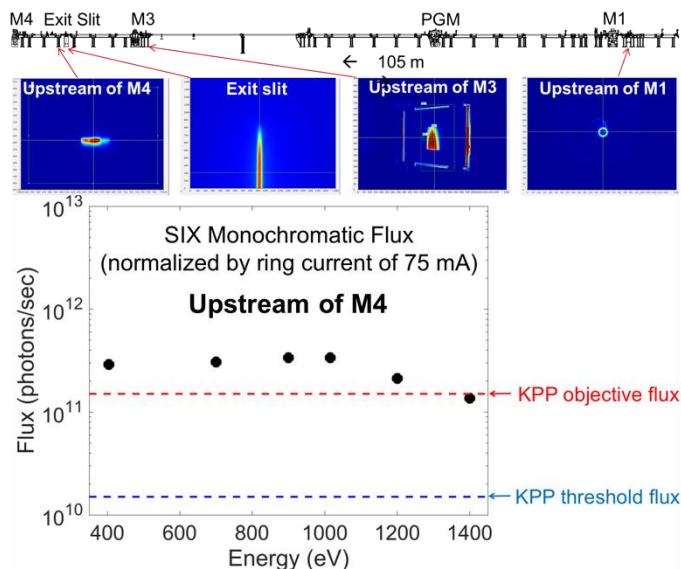


Figure 2. SIX: YAG images of the beam profile shown at four locations along the beamline (top). Flux of the monochromatic beam measured upstream of M4 with a 10- μ m exit slit for several photon energies between 400 eV and 1400 eV (bottom).

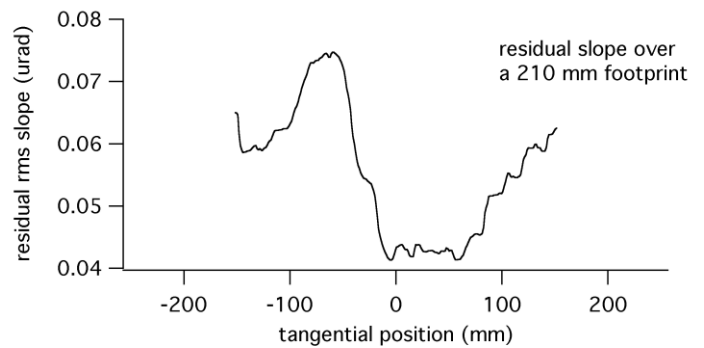


Figure 3. SIX: Residual slope error of the M7 mirror over a 210-mm footprint.



Figure 4. SIX: M6 mirror mounted in its holder prior to the installation inside the spectrometer optics tank.



Figure 5. SIX: Turbo pumping stations connected to the detector chamber and the spectrometer beam pipe in preparation for bake out.

SMI – SOFT MATTER INTERFACES

As shown on the cover, the SMI SAXS chamber is well on its way to completion. Initially, the internal components were assembled without the vacuum chamber modules in place. The detector Z rails, consisting of the rack, a support C channel profile, adjustable support feet, and other components were connected in overlapping staggered lengths, adjusted for level and straightness, and tested with the detector trolley plate and gear. After this, the rails were dismantled in 2m-long sections and replaced again one at a time, after each successive chamber module was lowered into place. In a parallel activity, 40-foot long in-vacuum cables consisting of nine 9-lead sets and two

12-lead sets were twisted in pairs, connectorized, and are waiting for delivery of the cable track, expected 15 March.

Commissioning of the SMI PDS and WAXS/sample chamber continued to make progress this month. Beam has been brought into the 12-ID-C hutch and the flux measured there has achieved the Objective KPP value of 1×10^{13} photons/second, when the ring current of 275 mA is scaled to 500 mA. The measurement was made with a photodiode at the sample position, and the measured current was corrected for the absorption of a thin YAG imaging crystal inserted before the diode. Subsequently, detailed measurements with the IVU and Double Crystal Monochromator have been used to determine that the IVU position is not yet optimal: the girder elevation is about 400 μm higher than intended. Figure 6 shows some of the images obtained during these studies. One more studies shift will be dedicated to studying the effects of adjusting taper angle and long coil current. After the IVU optimization studies are completed, the flux is expected to be slightly greater than the Objective KPP value at most energies.

Completion of DCM and X-ray Beam Position Monitor calibrations is expected in March.

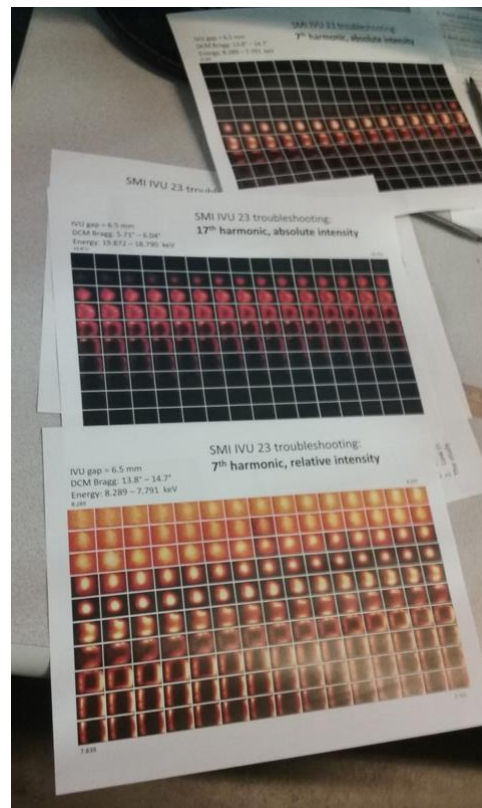


Figure 6. SMI: Series of images gathered from an exhaustive study of the monochromatic beam profile as a function of electron beam elevation and DCM Bragg angle for a given IVU gap setting.

PROJECT MILESTONES

Milestone	Planned	Actual
CD-0 (Mission Need):	May 27, 2010	May 27, 2010
CD-1 (Alternative Selection):	Sept. 30, 2011	Dec. 19, 2011
CD-2 (Performance Baseline):	Dec. 31, 2013	Oct. 9, 2013
CD-3A (Long Lead Procurement):	Dec. 31, 2013	Oct. 9, 2013
CD-3 (Start Construction):	Mar. 31, 2014	Jul. 7, 2014
Early Project Completion:	May 19, 2017	
CD-4 (Project Completion):	Sept. 29, 2017	

RECENT AND UPCOMING EVENTS

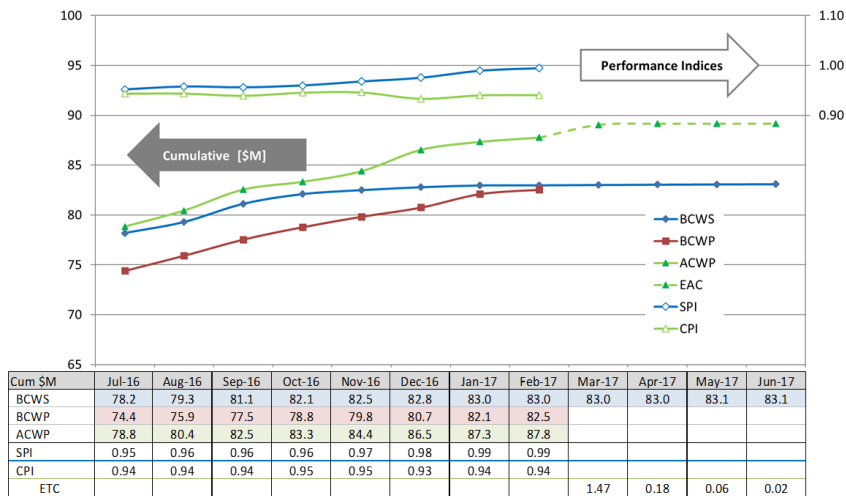
DOE/SC OPA CD-4 Review of NEXT	May 31-June 1, 2017
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Acronyms and Abbreviations

AC	Actual Cost	KPP	Key Performance Parameter
ACWP	Actual Cost of Work Performed	M&S	Material & Supplies
BAC	Budget at Completion	NEXT	NSLS-II Experimental Tools project
BCWP	Budgeted Cost of Work Performed	NSLS	National Synchrotron Light Source
BCWS	Budgeted Cost of Work Scheduled	NSLS-II	National Synchrotron Light Source II
CD	Critical Decision	OPA	Office of Project Assessment
CPI	Cost Performance Index	OPC	Other Project Costs
CV	Cost Variance	PCR	Project Change Request
DCM	Double Crystal Monochromator	PDS	Photon Delivery System
DOE	Department of Energy	PMB	Performance Management Baseline
EAC	Estimate At Completion	PV	Planned Value
EPS	Equipment Protection System	SAXS	Small Angle X-ray Scattering
ESM	Electron Spectro-Microscopy beamline	SC	Office of Science
ETC	Estimated Cost to Complete	SIX	Soft Inelastic X-ray Scattering beamline
EV	Earned Value	SMI	Soft Matter Interfaces beamline
EVMS	Earned Value Management System	SPI	Schedule Performance Index
FE	Front End	SV	Schedule Variance
FTE	Full Time Equivalent	TEC	Total Estimated Cost
FXI	Full-field X-ray Imaging beamline	TPC	Total Project Cost
FY	Fiscal Year	TRF	Triple Rotation Flange
GU	General User	UB	Undistributed Budget
ID	Insertion Device	VAC	Variance At Completion
IRR	Instrument Readiness Review	WAXS	Wide Angle X-ray Scattering
ISR	Integrated In-Situ and Resonant X-ray Studies	WBS	Work Breakdown Structure
ISS	Inner Shell Spectroscopy beamline	XPEEM	X-ray PhotoEmission Electron Microscopy
IVU	In-Vacuum Undulator	YAG	Yttrium Aluminum Garnet

COST AND SCHEDULE STATUS

Cost and schedule progress is being tracked using an Earned Value Management System (EVMS) against the cost and schedule baseline established on October 1, 2013. All baseline changes are being controlled through the NEXT Change Control Board. Cost and schedule revisions are being managed using Project Change Control procedures. From June 2015 forward, EAC is reported as the sum of actual cost to date (ACWP) plus the estimated cost to complete (ETC), at the individual activity and resource level, with account-level cost corrections applied as needed to account for the difference between the Earned Value and accrual schedules. ETC values are shown in the final row of the EVMS table below, and all EAC changes are captured in the monthly EAC log.



NEXT as of 2/28/2017	Current Period	Cum-to-Date
Plan (BCWS) \$k	10	82,980
Earned (BCWP) \$k	429	82,535
Actual (ACWP) \$k	424	87,754
SV \$k	419	-445
CV \$k	5	-5,219
SPI	44.96	0.99
CPI	1.01	0.94
Budget at Completion \$k (PMB [UB])		83,093
Planned % Complete (BCWS/BAC)		99.9%
Earned % Complete (BCWP/BAC)		99.3%
Contingency \$k		6,907
Contingency / (BAC – BCWP)		1236.4%
EAC \$k		89,222
Contingency / (EAC – BCWP)		103.3%
(Contingency + VAC) / (EAC – ACWP)		53.0%
TPC = PMB + Contingency		90,000

The NEXT project Schedule Variance (SV) for February 2017 is +\$419k, with an associated monthly Schedule Performance Index (SPI) of 44.96 (red status). The largest contributors to the current month schedule variance are provided in the table below. The cumulative SPI is 0.99 (green status), the same as it was in January.

The NEXT project Cost Variance (CV) for February 2017 is +\$5k, with an associated monthly Cost Performance Index (CPI) of 1.01 (green status). The significant contributors to the current month CV are provided in the table below. The cumulative CPI is 0.94 (green status), the same as it was in January.

Leading Current Month Variances [\$k], February 2017								
WBS	Title	PV	EV	AC	Schedule		Cost	
					SV	Issues	CV	Issues
2.01	Project Support	29	29	20	0	--	9	--
2.03	Common Systems	4	31	15	27	--	16	--
2.04	Controls	0	0	24	0	--	-24	--
2.05	ESM Beamline	0	0	-4	0	--	4	--
2.07	ISR Beamline	0	71	78	71	Activities earned this month that were scheduled to be performed earlier: Approval of KB mirror commissioning report (+\$30k), 6-circle diffractometer installation and commissioning activities (+\$41k)	-7	--
2.09	SIX Beamline	-24	218	193	242	Activities earned this month that were scheduled to be performed earlier: emission spectrometer installation & commissioning activities (+\$152k), M5 mirror installation (+\$41.5k), and receipt of small M&S items (+\$24.7k) [cryostat cooling braids (+\$5.5k), sample chamber Questar telescope mount (+\$15.6k), vacuum manifold & roughing pump (+\$3.6k)]. In addition, PCR 17_122 removed sample chamber Triple Rotating Flange installation activities (+\$23.5k).	25	--

Leading Current Month Variances [\$k], February 2017								
WBS	Title	PV	EV	AC	Schedule		Cost	
					SV	Issues	CV	Issues
2.10	SMI Beamline	0	79	99	79	SAXS/WAXS beam chamber assembly and test activities earned this month that were scheduled to be performed earlier.	-20	--
	Total	10	429	424	419	Total	5	

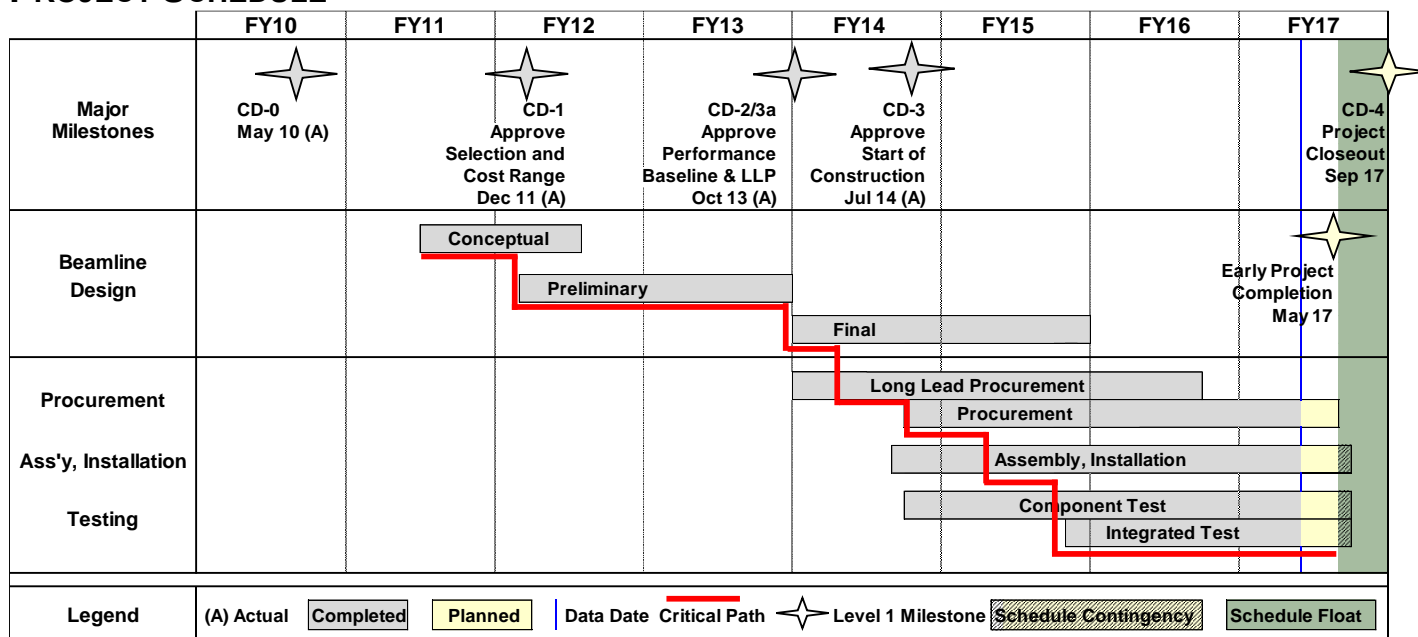
As of February 28, 2017, the project is 99.3% complete with 1236.4% contingency (\$6.91M) for \$0.56M Budget At Completion (BAC) work remaining, based on PCRs processed and approved through February 2017. The project EAC for February is reported at \$89,222k against a Performance Measurement Baseline (PMB)/Undistributed Budget (UB) of \$83,093k. The Variance At Completion (VAC) is given by $VAC = BAC - EAC$, with $EAC = ACWP + ETC$. Through February 2017, the VAC (-\$6,128k) is driven by the cumulative cost variance (-\$5,219k), which is dominated by labor cost overage on work performed to date.

The February EAC (\$89.22M) is essentially flat compared to the January value. As of the end of February, contingency on EAC is \$0.78M, which represents 53.0% of \$1.47M EAC work remaining. Outstanding commitments on fixed-price equipment contracts total \$1.28M, so the \$0.78M contingency on EAC represents 416.1% of \$0.19M unobligated EAC work to go. ETC will continue to be assessed monthly through project completion to contain costs while maintaining the good schedule performance that the project has demonstrated to date.

One PCR (17_122) was approved for February reporting, to extend project management and support activities from 1-Feb-17 through project completion, revise milestones in one SIX endstation contract, and incorporate minor updates to the WBS Dictionary. No PCRs are planned for March.

Milestones – Near Term		Planned	Actual	Projected
L3	ISR – Installation of Beamline Components Complete	29-Jun-16	8-Feb-17	
L3	WBS 2.04 – Beamline Control Systems Complete	14-Sep-16		March 2017
L3	SMI – Installation of Beamline Components Complete	16-Sep-16		March 2017
L3	ESM – Installation of Beamline Components Complete	29-Sep-16		April 2017
L3	SIX – Installation of Beamline Components Complete	30-Sep-16		May 2017
L3	Common Beamline Systems: EPS Installed	30-Sep-16	21-Feb-17	
L2	Early Project Completion – incl. IRR	31-Jan-17		19-May-2017

PROJECT SCHEDULE



As of February 2017, the critical path runs through activities related to the Triple Rotating Flange, a component of the SIX endstation sample chamber (WBS 2.09.02.03, SIX Beamline Systems Endstation Equipment).

Staffing Report

Staffing as of 2/28/2017	Current Period		Cumulative-to-Date	
	Planned ** (FTE-yr)	Actual (FTE-yr)	Planned ** (FTE-yr)	Actual (FTE-yr)
WBS 2.01 Project Management and Support	0.19	0.16	41.74	37.16
WBS 2.02 Conceptual and Advanced Conceptual Design	0.00	0.00	8.74	8.74
WBS 2.03 Common Beamline Systems	0.09	0.08	33.25	19.65 *
WBS 2.04 Control System	0.16	0.16	22.26	21.16
WBS 2.05 ESM Beamline	0.00	0.00	15.75	18.52
WBS 2.06 FXI Beamline	0.00	0.00	4.77	4.60
WBS 2.07 ISR Beamline	0.06	0.06	17.76	16.22
WBS 2.08 ISS Beamline	0.00	0.00	14.96	14.92
WBS 2.09 SIX Beamline	0.71	0.66	22.75	26.64
WBS 2.10 SMI Beamline	0.32	0.31	17.91	16.71
WBS 2.11 Insertion Devices	0.00	0.00	7.74	7.20
WBS 2.12 ID & FE Installation	0.00	0.00	3.88	7.97
Total	1.51	1.43	211.50	199.49

** Based on the NEXT working schedule

* A large fraction of utilities installation has been performed by contractors (M&S) rather than staff as originally planned

Number of individuals who worked on NEXT during February 2017: 70

Funding Profile

Funding Type	NEXT Funding Profile (\$M)						Total
	FY11	FY12	FY13	FY14	FY15	FY16	
OPC	3.0						3.0
TEC – Design		3.0	2.0				5.0
TEC – Fabrication		9.0	10.0	25.0	22.5	15.5	82.0
Total Project Cost	3.0	12.0	12.0	25.0	22.5	15.5	90.0

Key NEXT Personnel

Title	Name	Email	Phone
Federal Project Director	Robert Caradonna	rcaradonna@bnl.gov	631-344-2945
NEXT Project Manager	Steve Hulbert	hulbert@bnl.gov	631-344-7570

COST PERFORMANCE REPORT

CONTRACT PERFORMANCE REPORT												FORM APPROVED					
FORMAT 1 - WORK BREAKDOWN STRUCTURE												OMB No. 0704-0188					
1. CONTRACTOR			2. CONTRACT			3. PROGRAM			4. REPORT PERIOD								
a. NAME			a. NAME			a. NAME			a. FROM (YYYYMMDD)								
Brookhaven National Laboratory			NEXT			NSLS-II Experimental Tools (NEXT) Project			2017 / 02 / 01								
b. LOCATION (Address and ZIP Code)			b. NUMBER			b. PHASE			b. TO (YYYYMMDD)								
									2017 / 02 / 28								
			c. TYPE			d. SHARE RATIO			c. EVMS ACCEPTANCE								
									NO X YES (YYYYMMDD)								
8. PERFORMANCE DATA																	
WBS (2) WBS (3)		CURRENT PERIOD					CUMULATIVE TO DATE					AT COMPLETION					
		BUDGETED COST		ACTUAL COST WORK PERFORMED		VARIANCE		BUDGETED COST		ACTUAL COST WORK PERFORMED		BUDGETED		ESTIMATED		VARIANCE	
ITEM		WORK SCHEDULED	WORK PERFORMED				WORK SCHEDULED	WORK PERFORMED									
(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(14)	(15)	(16)			
2.01 Project Management and Support		29,258	29,258	20,013		9,245	9,947,490	9,947,490	10,845,714		(898,224)	10,057,456	10,945,845	(888,389)			
2.01.01 Project Management		9,484	9,484	14,015		(4,531)	4,607,513	4,607,513	4,206,583		400,930	4,243,697	4,243,693	401,274			
2.01.02 Project Support		19,773	19,773	5,997		13,776	5,339,977	5,339,977	6,639,132		(1,299,154)	5,412,489	6,702,152	(1,289,663)			
2.02 Conceptual Design and Advanced Conceptual Design		0	0	0	0	0	1,807,316	1,807,316	1,807,316	0	0	1,807,316	1,807,316	0	0	0	0
2.02.02 Conceptual Design and Analysis of Photon Delivery Systems		0	0	0	0	0	849,881	849,881	849,881	0	0	849,881	849,881	0	0	0	0
2.02.04 ESM Advanced Conceptual Design		0	0	0	0	0	101,376	101,376	101,376	0	0	101,376	101,376	0	0	0	0
2.02.05 FXI Advanced Conceptual Design		0	0	0	0	0	120,634	120,634	120,634	0	0	120,634	120,634	0	0	0	0
2.02.06 ISR Advanced Conceptual Design		0	0	0	0	0	210,700	210,700	210,700	0	0	210,700	210,700	0	0	0	0
2.02.07 ISS Advanced Conceptual Design		0	0	0	0	0	163,508	163,508	163,508	0	0	163,508	163,508	0	0	0	0
2.02.08 SIX Advanced Conceptual Design		0	0	0	0	0	179,533	179,533	179,533	0	0	179,533	179,533	0	0	0	0
2.02.09 SMI Advanced Conceptual Design		0	0	0	0	0	181,684	181,684	181,684	0	0	181,684	181,684	0	0	0	0
2.03 Common Beamline Systems		3,788	31,221	15,108	27,432	16,112	7,344,205	7,335,160	8,510,479	(9,045)	(1,175,319)	7,347,994	8,532,144	(1,184,150)			
2.03.01 Utilities		0	17,706	2,840	17,706	14,865	4,210,031	4,200,985	4,355,229	(9,045)	(154,243)	4,210,031	4,373,106	(163,075)			
2.03.02 Personnel Protection System (PPS)		0	2,251	2,431	2,251	(179)	1,620,824	1,620,824	2,361,626	0	(740,802)	1,620,824	2,361,626	(740,802)			
2.03.03 Equipment Protection System (EPS)		0	0	4,342	0	(4,342)	680,294	680,294	956,624	0	(276,330)	680,294	956,624	(276,330)			
2.03.04 Control Station		0	7,475	976	7,475	6,499	306,744	306,744	219,989	(0)	86,755	306,744	219,989	86,755			
2.03.05 Common Beamline Systems Management		3,788	3,788	4,520	0	(731)	526,312	526,312	617,010	0	(90,698)	530,101	620,798	(90,698)			
2.04 Control System		0	0	23,625	0	(23,625)	4,648,844	4,643,237	4,964,514	(5,607)	(321,277)	4,648,844	4,989,142	(340,298)			
2.04.01 Control System Management		0	0	0	0	0	294,427	294,427	257,275	0	37,152	294,427	257,275	37,152			
2.04.02 Control System Design & Implementation		0	0	23,286	0	(23,286)	2,929,314	2,923,707	3,373,536	(5,607)	(449,830)	2,929,314	3,397,646	(468,332)			
2.04.03 Control System Equipment		0	0	339	0	(339)	1,425,103	1,425,103	1,333,702	0	91,401	1,425,103	1,334,221	90,882			
2.05 ESM Beamline		0	0	(4,086)	0	4,086	9,422,464	9,362,517	10,128,136	(59,947)	(765,619)	9,422,464	10,184,867	(762,403)			
2.05.01 ESM Management		0	0	0	0	0	610,744	610,744	474,027	0	136,718	610,744	474,027	136,718			
2.05.02 ESM Beamline Systems		0	0	(4,086)	0	4,086	8,811,720	8,751,773	9,654,109	(59,947)	(902,337)	8,811,720	9,710,840	(899,121)			
2.06 FXI Beamline		0	0	0	0	0	1,818,324	1,818,324	1,793,425	0	24,899	1,818,324	1,793,425	24,899			
2.06.01 FXI Management		0	0	0	0	0	409,359	409,359	470,908	0	(61,549)	409,359	470,908	(61,549)			
2.06.02 FXI Beamline Systems		0	0	0	0	0	1,408,965	1,408,965	1,322,516	0	86,448	1,408,965	1,322,516	86,448			
2.07 ISR Beamline		0	71,357	77,981	71,357	(6,624)	10,392,425	10,271,473	10,410,711	(120,952)	(139,238)	10,392,425	10,531,663	(139,238)			
2.07.01 ISR Management		0	0	0	0	0	1,105,394	1,105,394	1,034,389	0	71,005	1,105,394	1,034,389	71,005			
2.07.02 ISR Beamline Systems		0	71,357	77,981	71,357	(6,624)	9,287,031	9,166,079	9,376,322	(120,952)	(210,243)	9,287,031	9,497,274	(210,243)			
2.08 ISS Beamline		0	0	0	0	0	10,472,212	10,472,212	11,236,443	0	(764,231)	10,472,212	11,236,443	(764,231)			
2.08.01 ISS Management		0	0	0	0	0	838,199	838,199	681,035	0	157,164	838,199	681,035	157,164			
2.08.02 ISS Beamline Systems		0	0	0	0	0	9,634,013	9,634,013	10,555,409	0	(921,395)	9,634,013	10,555,409	(921,395)			
2.09 SIX Beamline		(23,504)	218,261	192,886	241,765	25,375	11,741,332	11,513,437	12,571,764	(227,895)	(1,058,328)	11,741,332	13,668,050	(1,926,719)			
2.09.01 SIX Management		0	0	7,127	0	(7,127)	729,841	729,841	749,167	0	(19,326)	729,841	749,167	(19,326)			
2.09.02 SIX Beamline Systems		(23,504)	218,261	185,759	241,765	32,502	11,011,491	10,783,596	11,822,598	(227,895)	(1,039,002)	11,011,491	12,918,883	(1,907,393)			
2.10 SMI Beamline		0	78,939	99,069	78,939	(20,130)	9,126,837	9,105,435	9,467,299	(21,402)	(361,864)	9,126,837	9,514,324	(387,487)			
2.10.01 SMI Management		0	0	0	0	0	805,656	805,656	706,837	0	98,819	805,656	706,837	98,819			
2.10.02 SMI Beamline Systems		0	78,939	99,069	78,939	(20,130)	8,321,181	8,299,779	8,760,462	(21,402)	(460,683)	8,321,181	8,807,487	(486,306)			
2.11 Insertion Devices		0	0	(784)	0	784	4,805,392	4,805,392	4,565,517	0	239,876	4,805,392	4,565,517	239,876			
2.11.01 ESM EPU Insertion Device		0	0	(784)	0	784	4,587,795	4,587,795	4,400,861	0	186,934	4,587,795	4,400,861	186,934			
2.11.02 SIX EPU Insertion Device		0	0	0	0	0	117,137	117,137	70,375	0	46,762	117,137	70,375	46,762			
2.11.03 Insertion Devices Management		0	0	0	0	0	100,460	100,460	94,281	0	6,179	100,460	94,281	6,179			
2.12 ID & FE Installation & Testing		0	0	0	0	0	1,452,816	1,452,816	1,452,960	0	(143)	1,452,816	1,452,960	(143)			
2.12.01 ID & FE Installation & Testing Management		0	0	0	0	0	20,739	20,739	20,739	0	0	20,739	20,739	0	0	0	0
2.12.02 ID Installation & Testing		0	0	0	0	0	584,560	584,560	584,560	0	(0)	584,560	584,560	(0)			
2.12.03 FE Installation & Testing		0	0	0	0	0	847,517	847,517	847,660	0	(143)	847,517	847,660	(143)			
Total Project Baseline		9,542	429,035	423,813	419,493	5,223	82,979,658	82,534,810	87,754,278	(444,848)	(5,219,468)	83,093,413	89,221,696	(6,128,283)			
Management Reserve																	
Undistributed Budget																	
Performance Management Baseline (PMB)		9,542	429,035	423,813	419,493	5,223	82,979,658	82,534,810	87,754,278	(444,848)	(5,219,468)	83,093,413	89,221,696	(6,128,283)			